

**THREE SPECIES OF FACULTATIVE MYODOCHINI
(LYGAEOIDEA: RHYPAROCHROMIDAE) ASSOCIATED WITH
FIGS IN MEXICO**

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Abstract.—The biology of the lygaeoids *Myodocha intermedia* Distant, *M. unispinosa* Stål, and *Neopamera bilobata* (Say) were studied in eastern Mexico between 2001 and 2003. Descriptions and illustrations of their immature stages are presented for the first time. Their life cycles under laboratory conditions and wild fig hosts are also included. These lygaeoids are reported as frequent facultative, terrestrial seed predators of *Ficus* spp.

Resumen.—La biología de los lygaeoideos *Myodocha intermedia* Distant, *M. unispinosa* Stål y *Neopamera bilobata* (Say) fue estudiada en campo, en el Este de México, entre 2001 y 2003. Las descripciones e ilustraciones de sus estadios inmaduros se presentan por primera vez. También, se incluyen datos sobre su ciclo de vida bajo condiciones de laboratorio e higueras silvestres hospederas. Se observó que estos lygaeoideos son depredadores facultativos terrestres frecuentes de semillas de *Ficus* spp.

Key Words: *Ficus*, immature stages, life cycle, Lygaeoidea, *Myodocha*, *Neopamera*

More than 30 years ago, Slater (1972) recognized the association of lygaeoids with figs. In this work, based on species from Africa and the Caribbean, Slater separated this guild of insects into four groups, depending on the degree of specialization on figs: I. ARBOREAL SEED PREDATORS. Species that live in the fig trees themselves and feed on the seeds, while the latter are still in the syconium. II. OBLIGATORY TERRESTRIAL SEED PREDATORS. Species that live in the litter layer below the trees and feed only, or primarily, on *Ficus* seeds. III. FREQUENT FACULTATIVE TERRESTRIAL SEED PREDATORS. Species that live in the litter layer below *Ficus* trees and feed on the seeds, but feed on seeds of other plants as well; and

IV. ACCIDENTAL TERRESTRIAL SEED PREDATORS. Species that feed primarily on other seeds but utilize seeds of *Ficus* when they occur in the insect's habitat.

Since Slater (1972), there have been only a few publications treating the lygaeoids associated with figs (Rodríguez 1998a, b, c; Brambila 2000; Cervantes and Pacheco 2003; Cervantes et al. 2004). These studies deal mainly with lygaeoids that correspond to the first two categories proposed by Slater. The present study is the first one to consider species of Myodochini that are frequent facultative terrestrial seed predators. Herein we report the life cycles of *Myodocha intermedia* Distant, *Myodocha unispinosa* Stål, and *Neopamera bilobata* (Say) including descriptions and illustrations of

all life history stages, their biology, and host plants.

This paper is the first part of a series presenting, information regarding other species of lygaeoids associated with figs will be published latter on, as well as data on the effect of these seed predators on seed germination will be published later.

MATERIALS AND METHODS

Monthly collecting trips between 2001 and 2003 were made to several localities in the Mexican states of Campeche, Puebla, Tamaulipas, and Veracruz. The objective was to collect Heteroptera associated with wild fruiting fig trees. About 30 fig species were sampled from localities occurring at sea level to an altitude of 1,500 m. Several types of vegetation were included: low tropical dry forest, medium tropical forest, high tropical rain forest, and cloud forest.

Biological information was obtained mainly from two biological research stations. Estacion Biologica La Mancha is situated at sea level on the coast of Veracruz, 30 km NE of Ciudad Cardel (96°22'40"W and 19°35'2"N); Estacion Biologica Los Tuxtlas (94°40'W and 18°00'N), elevation varies from sea level to around 400 m is also situated in the state of Veracruz, but 150 km south of Estacion Biologica La Mancha. The type of vegetation at La Mancha is mainly medium tropical dry forest, and at Los Tuxtlas it is dominated by high tropical rain forest.

The ground area covered by the crown of each fruiting tree, including leaf litter, buttresses, and aerial roots, was checked. Top parts of each tree were searched by climbing the tree with the use of ropes or free-hand using their aerial root systems. Bugs were collected by using an aspirator or by cutting small branches bearing fruits. Insects were kept alive and put into plastic containers (9 × 8 cm) covered with muslin cloth to avoid condensation. A dry leaf of the fig tree and an opened fruit were put in each container as well as a small damp cotton ball; these were changed every three

days. Containers were checked daily for the presence of eggs. Individuals were kept under laboratory conditions at about 20°C and 70% RH. Individuals fixed in 70% alcohol were used for illustrations and descriptions; measurements are given in mm ± 1DS. Descriptions of the adults are based on the original descriptions (Say 1831. Stal 1874, Distant 1882).

Voucher specimens have been deposited in the Coleccion Entomologica del Instituto de Ecologia, A.C. Xalapa, Veracruz, Mexico (IEXA).

DESCRIPTIONS

Myodocha intermedia Distant (Figs. 1A–G)

Egg (Fig. 1A).—Elongate, anterior pole rounded and posterior pole slightly pointed. 1.22 ± 0.04 mm long by 0.48 ± 0.02 mm wide ($n = 10$). Yellowish white when laid, and turn red in four d. Chorion with very small projections, be coming more apparent on both poles. Operculum with 5 mycrophilous processes.

First instar (Fig. 1B).—Body elongate. Head, pronotum and antennal segment IV reddish brown; eyes red; antennal segment I pale brown, antennal segments II and III yellowish white. Rostral segment I pale brown, remainder yellowish white. Posterior margin of pronotum with a narrow red band. Meso- and metanota pale brown. Propleuron reddish brown, meso- and metapleura pale brown. Coxae pale brown; Front and middle femora and tibiae, and tarsi yellowish white; hind femur and tibiae slightly darker. Abdomen yellowish white with irregular red areas on lateral margins of segments I and II; with a red, cross-shape area on midline of segments III to VIII and along segment IV; tip of abdomen pale brown. Scent gland openings present between segments III–IV, IV–V, and V–VI as small grayish areas. Abdominal venter yellowish with red areas on lateral margins of segments I, II, and IV. Long thick hairs situated symmetrically on lateral margins as

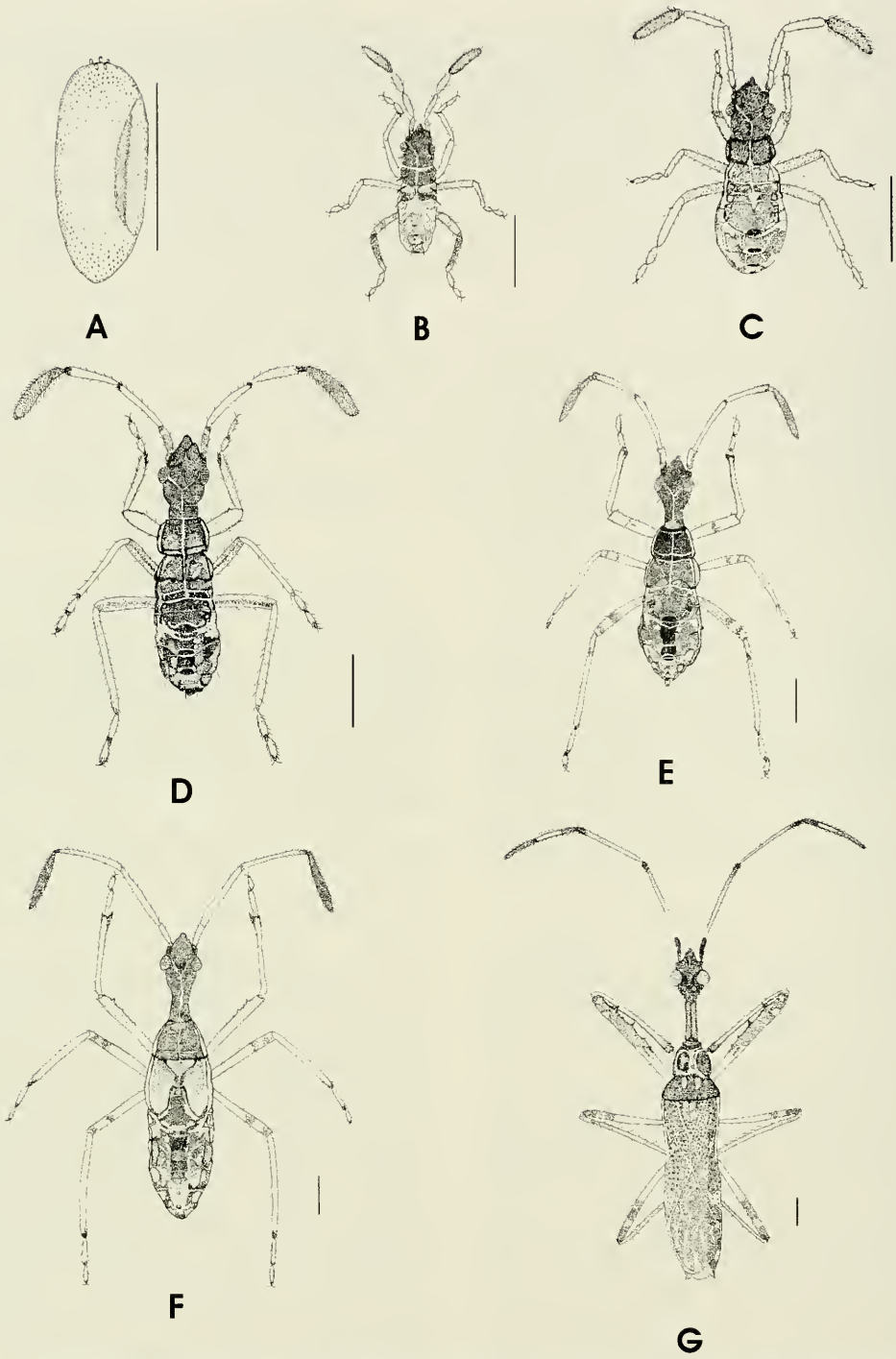


Fig. 1. Instars of *Myodocha intermedia* Distant. A, Egg. B, First instar. C, Second instar. D, Third instar. E, Fourth instar. F, Fifth instar. G, Adult male. (Scale = 1 mm)

follows: a pair in front of eyes, one behind eyes, one on posterior margin of pro-, meso-, and metanota, two hairs on abdominal segment III, and one hair on segments IV to VI. Long more slender hairs also present on margins of head and abdomen especially on last four segments; ventral surface of abdomen with numerous hairs. Rostrum reaching metacoxae. Tibiae of all legs covered by numerous hairs. *Measurements* ($n = 10$): Body length 1.65 ± 0.12 ; head length 0.52 ± 0.05 ; width across eyes 0.44 ± 0.02 ; interocular distance 0.26 ± 0.01 ; postocular distance 0.150 ± 0.02 ; antennal segments: I 0.2 ± 0.02 , II 0.32 ± 0.02 , III 0.3 ± 0.02 , IV 0.51 ± 0.02 ; rostral segments: I 0.28 ± 0.03 , II 0.31 ± 0.02 , III 0.22 ± 0.02 , IV 0.27 ± 0.02 ; pronotum length 0.2 ± 0.02 ; width across humeral angles 0.43 ± 0.01 ; width across anterior margin 0.40 ± 0.01 ; fore leg: femur length 0.45 ± 0.03 ; tibia length 0.44 ± 0.02 ; tarsi length: I 0.13 ± 0.02 , II 0.2 ± 0.01 .

Second instar (Fig. 1C).—Body slightly pyriforme. Head and pronotum brown. Eyes brownish red. Antennal segments I to III yellowish white, segment IV reddish brown. Rostral segment I grayish yellow, remainder yellowish white with tip of segment IV brown. Propleuron brown, meso- and metapleura yellowish white. Legs yellowish white, although some individuals with darker femora. Meso- and metanota and abdominal segments I and II grayish; middle of segments III to V also grayish. Red areas present only on lateral margins of segment IV and on midline of segments VI to VIII. Rostrum reaching metacoxae. *Measurements* ($n = 10$): Body length 2.370 ± 0.18 ; head length 0.66 ± 0.02 ; width across eyes 0.54 ± 0.03 ; interocular distance 0.31 ± 0.01 ; postocular distance 0.21 ± 0.02 ; antennal segments: I 0.24 ± 0.02 , II 1.48 ± 0.02 , III 0.44 ± 0.02 , IV 0.65 ± 0.03 ; rostral segments: I 0.36 ± 0.04 , II 0.36 ± 0.04 , III 0.29 ± 0.02 , IV 0.28 ± 0.02 ; pronotum length 0.28 ± 0.02 ; width across humeral angles 0.53 ± 0.03 ; width across anterior margin 0.44 ± 0.01 ; fore leg: femur

length 0.66 ± 0.05 ; tibia length 0.65 ± 0.04 ; tarsi length: I 0.20 ± 0.03 , II 0.24 ± 0.01 .

Third instar (Fig. 1D).—Similar to second instar, although meso- and metanota and abdomen slightly darker. Thick hairs less apparent. Abdomen with "Y" suture visible and delimited by dark brown lines. Red areas of abdominal segment IV of preceding instars turning brown and red areas on midline of segments VI to VIII less apparent. Rostrum reaching mesocoxae. *Measurements* ($n = 5$): Body length 3.3 ± 0.25 ; head length 0.92 ± 0.14 ; width across eyes 0.64 ± 0.02 ; interocular distance 0.36 ± 0.02 ; postocular distance 0.4 ± 0.05 ; antennal segments: I 0.33 ± 0.04 , II 0.73 ± 0.08 , III 0.66 ± 0.05 , IV 0.89 ± 0.09 ; rostral segments: I 0.52 ± 0.07 , II 0.48 ± 0.05 , III 0.4 ± 0.07 , IV 0.3 ± 0.03 ; pronotum length 0.42 ± 0.04 ; width across humeral angles 0.61 ± 0.06 ; width across anterior margin 0.46 ± 0.01 ; fore leg: femur length 0.92 ± 0.06 ; tibia length 0.94 ± 0.04 ; tarsi length: I 0.27 ± 0.03 , II 0.27 ± 0.02 .

Fourth instar (Fig. 1E).—Pyriform, but with an elongated neck. Head, pro-, meso-, and metanota, and propleuron dark brown. Pro- and mesonota with a pale yellow submarginal band. Legs pale yellow; femora of all legs with two pale brown "rings" near distal ends, most apparent on middle and hind femora. Abdomen grayish with only a few pale yellow areas, with dark brown area along midline of segments III to VI and across scent gland openings. Rostrum slightly passing procoxae. Mesothoracic wing pads covering metanotum. *Measurements* ($n = 3$): Body length 4.93 ± 0.3 ; head length 1.42 ± 0.06 ; width across eyes 0.84 ± 0.05 ; interocular distance 0.41 ± 0.01 ; postocular distance 0.65 ± 0.05 ; antennal segments: I 0.43 ± 0.06 , II 1.22 ± 0.1 , III 1.10 , IV 1.32 ± 0.06 ; rostral segments: I 0.63 ± 0.06 , II 0.67 ± 0.09 , III 0.57 ± 0.12 , IV 0.38 ± 0.03 ; pronotum length 0.73 ± 0.03 ; width across humeral angles 0.84 ± 0.05 ; width across anterior margin 0.53 ± 0.03 ; fore leg: femur length 1.55 ± 0.15 ; tibia

length 1.52 ± 0.1 ; tarsi length: I 0.45 ± 0 , II 0.35 ± 0 .

Fifth instar (Fig. 1F).—Body elongate with neck well differentiated. Head, pronotum, and scutellum brown. Eyes dark brown. Antennal segments I–III pale yellow, distal end of segment III slightly reddish, and segment IV reddish brown. Mesothoracic wing pads with base pale brown and distal half yellowish brown. Femora darker than preceding and instead of having two pale brown rings, has one yellowish white annulus. Abdomen variegated with grayish and pale yellow areas. Dark brown area on midline of abdomen divided and present only around scent gland openings, red areas absent. Rostrum not reaching procoxae. Lateral margins of pronotum and mesothoracic wing pads emarginate. Front femur with two rows of small spines near distal end. *Measurements* ($n = 4$): Body length 6.85 ± 0.68 ; head length 2.04 ± 0.14 ; width across eyes 1.02 ± 0.12 ; interocular distance 0.51 ± 0.06 ; postocular distance 1.12 ± 0.05 ; antennal segments: I 0.62 ± 0.06 , II $1.650.15$, III 1.52 ± 0.16 , IV 1.62 ± 0.19 ; rostral segments: I 0.76 ± 0.08 , II 0.81 ± 0.11 , III 0.6 ± 0.08 , IV 0.45 ± 0.04 ; pronotum length 0.95 ± 0.18 ; width across humeral angles 1.28 ± 0.12 ; width across anterior margin 0.61 ± 0.06 ; scutellum length 0.69 ± 0.08 ; scutellum width 0.96 ± 0.09 ; fore leg: femur length 2.12 ± 0.1 ; tibia length 2.24 ± 0.12 ; tarsi length: I 0.66 ± 0.08 , II 0.5 ± 0.05 .

Adult (Fig. 1G).—Body elongate and narrow, posterior region of head forming a long neck. Posterior lobe of pronotum, scutellum, clavus, and chorion with numerous punctures. Head, pronotum, scutellum, and thoracic pleura black, head slightly shiny. Eyes brownish red. Antennal segment I dark brown, segments II and III pale brown with base pale yellow; segment IV brown with a pale yellow subbasal annulus. Rostral segments I and IV brown, segment IV with yellow base; segments II and III pale yellow. Anterior pronotal lobe black, sometimes with grayish areas around calli. Cox-

ae black; front femur with proximal third pale yellow, and distal two-thirds brown with a pale yellow subapical annulus; middle and hind femora with proximal two-thirds pale yellow and distal third brown with a pale yellow subdistal annulus. Tibiae and tarsi of all legs pale yellow, sometimes bases of tibiae slightly darker. Clavus black with pale yellow margins. Chorion brownish black with a few pale yellow areas on basal half and yellowish white area near apex. Membrane brownish black with veins and apical macula pale yellow. Abdominal venter brownish black, although first two visible sternites slightly less dark. Head with only a few long hairs in front of eyes, rest of head surface with very small, flat hairs. Rostrum not reaching procoxae and, in most individuals, only passing neck region. Front femur with a double-ranked series of ventral spines, longest situated on annulated portion; front tibiae of male with a small spine on proximal third, lacking in female.

Male: *Measurements* ($n = 10$): Body length 11.04 ± 0.5 ; head length 3.12 ± 0.17 ; width across eyes 1.22 ± 0.04 ; interocular distance 0.48 ± 0.03 ; interocellar distance 0.19 ± 0.03 ; postocular distance 1.79 ± 0.28 ; antennal segments: I 0.89 ± 0.04 , II 2.75 ± 0.22 , III 2.58 ± 0.16 , IV 2.56 ± 0.16 ; rostral segments: I 0.93 ± 0.07 , II 1.04 ± 0.05 , III 0.92 ± 0.05 , IV 0.52 ± 0.05 ; pronotum length 2 ± 0.15 ; width across humeral angles 2 ± 0.12 ; width across anterior margin 0.64 ± 0.07 ; scutellum length 1.12 ± 0.08 ; scutellum width 1.01 ± 0.09 ; fore leg: femur length 3.5 ± 0.27 ; tibia length 3.19 ± 0.2 ; tarsi length: I 1.02 ± 0.06 , II 0.2 ± 0 ; III 0.3 ± 0.03 .

Female: *Measurements* ($n = 10$): Body length 11.29 ± 0.58 ; head length 3.06 ± 0.33 ; width across eyes 1.31 ± 0.05 ; interocular distance 0.55 ± 0.04 ; interocellar distance 0.2 ± 0.02 ; postocular distance 1.82 ± 0.13 ; antennal segments: I 0.89 ± 0.06 , II 2.54 ± 0.24 , III 2.36 ± 0.2 , IV 2.41 ± 0.14 ; rostral segments: I 0.99 ± 0.06 , II 1.08 ± 0.08 , III 0.95 ± 0.06 , IV 0.5 ± 0.04 ;

pronotum length 1.95 ± 0.2 ; width across humeral angles 2.22 ± 0.09 ; width across anterior margin 0.66 ± 0.06 ; scutellum length 1.14 ± 0.13 ; scutellum width 1.18 ± 0.11 ; fore leg: femur length 3.35 ± 0.33 ; tibia length 3.09 ± 0.28 ; tarsi length: I 1.02 ± 0.06 , II 0.22 ± 0.05 ; III 0.3 ± 0.03 .

Biology.—At Los Tuxtla, *Myodocha intermedia* fed on fallen fruits of *Ficus insipida* Willd., it was also collected at night at the lights of the Field Station. In Campeche, this species was found under the crown of *Ficus cotinifolia* (Kunth). Nymphs and adults were observed running between leaf litter and ground vegetation feeding on the open fruits of this species.

Under laboratory conditions, adults collected at light reproduced easily when they were fed fruits of *F. cotinifolia*. Adults oviposited on a cotton ball or on a leaf. Although second-instar nymphs died in great quantities, several nymphs reached to the adult stage.

Records from material deposited in Coleccion Nacional de Insectos (Instituto de Biologia, U.N.A.M.) showed that *M. intermedia* is often collected at light, and, although not much of its biology is known, it probably feeds on seeds of other plants.

Myodocha unispinosa Stål
(Figs. 2A–G)

Egg (Fig. 2A).—Elongate, anterior pole rounded and posterior pole slightly pointed. 1.1 ± 0.04 mm long by 0.41 ± 0.01 mm width. Yellowish white when laid and turns red in four d. Chorion almost smooth, with a few punctures near anterior pole. Operculum with 5–6 mycophilic processes.

First instar (Fig. 2B).—Body elongate, evenly slender. Head, pronotum, and antennal segment IV dark brown; eyes bright red; antennal segment I pale brown with distal third yellowish white, antennal segments II and III yellowish white. Posterior margin of pronotum with a narrow red band. Meso- and metanota pale brown, thoracic pleura dark brown with a few red areas. Femora brown with distal ends slightly paler, tibiae

varying from grayish yellow to pale brown. tarsi generally yellowish white. Abdominal segments I to IV white, becoming yellowish near segment III, abdominal sternites I to IV yellowish white, with a reddish band near lateral margins. Remainder of abdomen, dorsally and ventrally variegated with red and yellow areas. Scent glands of segments III–IV, IV–V, and V–VI very small and pale brown. Posterior end of body brown. Head declivent, labium reaching abdominal sternum II; dorsal surface of body covered with numerous erect hairs, ventral surface with hairs only on abdomen. **Measurements** ($n = 10$): Body length 1.65 ± 0.21 ; head length 0.47 ± 0.14 ; width across eyes 0.4 ± 0.04 ; interocular distance 0.26 ± 0.01 ; postocular distance 0.17 ± 0 ; antennal segments: I 0.16 ± 0.01 , II 0.28 ± 0.04 , III 0.24 ± 0.04 , IV 0.44 ± 0.09 ; rostral segments: I 0.23 ± 0.02 , II 0.26 ± 0.01 , III 0.18 ± 0.02 , IV 0.25 ± 0 ; pronotum length 0.17 ± 0 ; width across humeral angles 0.36 ± 0.06 ; width across anterior margin 0.32 ± 0.04 ; fore leg: femur length 0.44 ± 0.12 ; tibia length 0.51 ± 0.05 ; tarsi length: I 0.16 ± 0.01 , II 0.16 ± 0.01 .

Second instar (Fig. 2C).—Body slightly pyriform, maximum width across abdominal segment IV. Head and pronotum dark brown; eyes brownish red. Antennal segment II grayish yellow and segments III and IV reddish brown. Rostral segment I brown, II, III, and IV grayish yellow, apex of segment IV brown. Meso- and metanota brown, sometimes lateral margins yellowish white. Femora and tibiae brown, tarsi grayish yellow. Abdominal segment I with a pale brown macula on each side of midline, segment II, anterior half of segment III, and posterior half of segment IV pale brown; a pale yellow band across segments III and IV; segments V to VIII with pale yellow areas surrounded by brown bands along lateral margins but extending toward scent gland openings. Scent gland opening of segments III–IV well defined with a rectangular brown area; the ones of segments IV–V and V–VI smaller. **Measurements** ($n =$

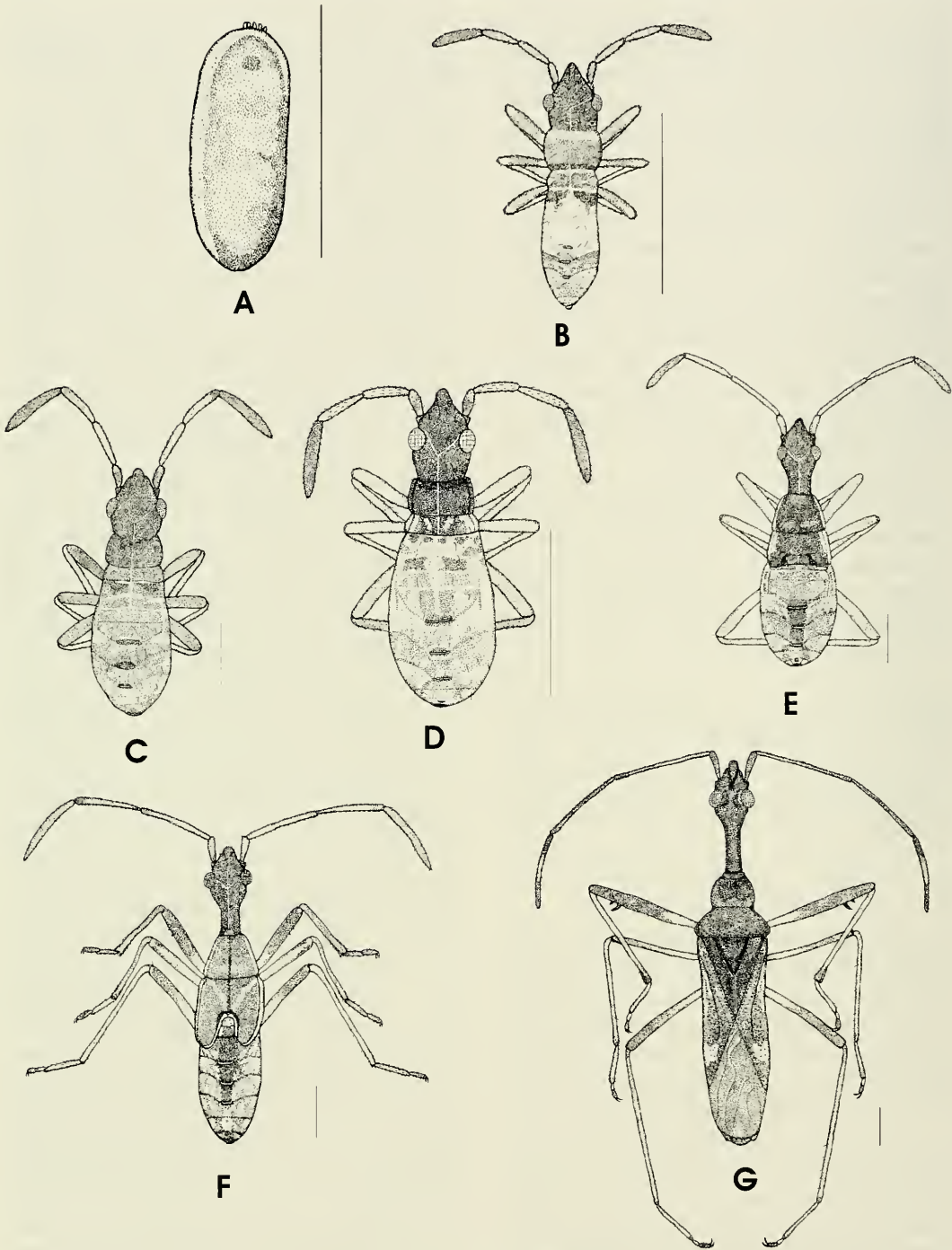


Fig. 2. Instars of *Myodocha unispinosa* Stål. A, Egg. B, First instar. C, Second instar. D, Third instar. E, Fourth instar. F, Fifth instar. G, Adult male. (Scale = 1 mm)

10). Body length 2.1 ± 0.14 ; head length 0.55 ± 0 ; width across eyes 0.52 ± 0.04 ; interocular distance 0.36 ± 0.01 ; postocular distance 0.15 ± 0 ; antennal segments: I 0.26 ± 0.01 , II 0.42 ± 0.04 , III 0.32 ± 0.04 , IV 0.65 ± 0 ; rostral segments: I 0.39 ± 0.05 , II 0.41 ± 0.06 , III 0.35 ± 0.07 , IV 0.25 ± 0.02 ; pronotum length 0.35 ± 0.07 ; width across humeral angles 0.55 ± 0 ; width across anterior margin 0.46 ± 0.01 ; fore leg: femur length 0.67 ± 0.07 ; tibia length 0.78 ± 0.03 ; tarsi length: I 0.22 ± 0.03 , II 0.23 ± 0.01 .

Third instar (Fig. 2D).—Similar to second instar, although head longer and neck starts to appear. Antennal segments II and III and tibiae yellow, front tibia slightly paler. Rostrum reaching mesocoxae. Other characteristics as in second instar. *Measurements* ($n = 10$): Body length 2.55 ± 0.21 ; head length 0.79 ± 0.16 ; width across eyes 0.52 ± 0.04 ; interocular distance 0.37 ± 0.1 ; postocular distance 0.18 ± 0.1 ; antennal segments: I 0.24 ± 0.02 , II 0.48 ± 0.1 , III 0.44 ± 0.09 , IV 0.64 ± 0.1 ; rostral segments: I 0.37 ± 0.07 , II 0.4 ± 0.1 , III 0.36 ± 0.05 , IV 0.29 ± 0.04 ; pronotum length 0.27 ± 0.07 ; width across humeral angles 0.48 ± 0.16 ; width across anterior margin 0.34 ± 0.04 ; fore leg: femur length 0.72 ± 0.11 ; tibia length 0.98 ± 0.12 ; tarsi length: I 0.26 ± 0.05 , II 0.22 ± 0.04 .

Fourth instar (Fig. 2E).—Body elongate, with a well-defined neck. Head dark brown, almost black. Antennal segments II and III yellowish red, IV reddish brown. Pro-, meso-, and metanota brown with a few areas slightly darker, lateral borders of pro- and mesonota emarginate and yellow ochraceous. Legs mostly yellow ochraceous, with distal ends of femora grayish yellow. Abdominal segments with pale brown and yellowish white areas. A mesial brown band on segments II to V, quadrangular brown areas on segments IV and V similar in size to scent gland openings. "Y" suture present and well defined anteriorly. Front femur with two rows of well-defined spines. Mesothoracic wing pads almost covering metanotum. *Measurements* ($n = 10$): Body

length 5.2 ± 0.56 ; head length 1.38 ± 0.11 ; width across eyes 0.84 ± 0.02 ; interocular distance 0.42 ± 0.03 ; postocular distance 0.28 ± 0.2 ; antennal segments: I 0.42 ± 0.03 , II 1.08 ± 0.1 , III 1 ± 0 , IV 1.15 ± 0.07 ; rostral segments: I 0.6 ± 0.1 , II 0.75 ± 0 , III 0.71 ± 0.01 , IV 0.38 ± 0.05 ; pronotum length 0.7 ± 0.07 ; width across humeral angles 0.92 ± 0.1 ; width across anterior margin 0.45 ± 0 ; fore leg: femur length 1.6 ± 0.14 ; tibia length 1.85 ± 0.21 ; tarsi length: I 0.54 ± 0.09 , II 0.37 ± 0.04 .

Fifth instar (Fig. 2F).—Body elongate, with interocular distance less than postocular distance. Head with area around tylus and neck darker than remainder. Distal half of femora pale brown with pale yellow spots. Mesial band of abdominal segments II to V better defined and slightly darker. Meso- and metathoracic wing pads reaching posterior margin of abdominal segment III. Other characteristics as in fourth instar. *Measurements* ($n = 10$): Body length 7 ± 0.85 ; head length 1.95 ± 0.07 ; width across eyes 0.95 ± 0 ; interocular distance 0.45 ± 0 ; postocular distance 1.05 ± 0.07 ; antennal segments: I 0.57 ± 0.03 , II 1.68 ± 0.1 , III 1.48 ± 0.04 , IV 1.75 ± 0.02 ; rostral segments: I 0.8 ± 0 , II 1 ± 0.07 , III 1.1 ± 0.07 , IV 0.52 ± 0.04 ; pronotum length 0.95 ± 0.07 ; width across humeral angles 1.05 ± 0.07 ; width across anterior margin 0.48 ± 0.04 ; scutellum length 0.8 ± 0.1 ; scutellum width 0.75 ± 0 ; fore leg: femur length 2.25 ± 0.21 ; tibia length 2.9 ± 0.28 ; tarsi length: I 0.9 ± 0.14 , II 0.45 ± 0.07 .

Adult (Fig. 2G).—Body narrow, elongate; posterior region of head forming a long neck. Head, pronotum, scutellum, thoracic pleura, and abdominal venter black. Antennal segment I dark brown, segments I and III brown ochraceous, segment IV yellowish white with base and distal half dark brown. Rostrum mostly yellowish brown, with segment I and apex of IV dark brown. Coxae dark brown; femora dark brown with base white; tibiae and tarsi ochraceous. Clavus and chorion dark brown, margins and veins yellowish brown,

chorion also with a white subapical macula. Membrane dark brown, with yellowish apical area. Head and pronotum glabrous; posterior lobe of pronotum, clavus, and chorion with numerous punctures; scutellum with a few punctures along lateral margins. Rostrum reaching mesocoxae. Front femur with two small and one large spine near distal end. Ventral surface with numerous short, silvery hairs, especially abundant on abdominal venter.

Male: *Measurements* ($n = 10$): Body length 9.65 ± 0.92 ; head length 2.85 ± 0.35 ; width across eyes 1.12 ± 0.03 ; interocular distance 0.5 ± 0 ; interocellar distance 0.22 ± 0.02 ; postocular distance 1.48 ± 0.45 ; antennal segments: I 0.78 ± 0.04 , II 2.85 ± 0.78 , III 2.12 ± 0.04 , IV 2.18 ± 0.04 ; rostral segments: I 0.88 ± 0.1 , II 1.25 ± 0.35 , III 1.25 ± 0.49 , IV 0.52 ± 0.1 ; pronotum length 1.7 ± 0.14 ; width across humeral angles 1.65 ± 0.07 ; width across anterior margin 0.45 ± 0 ; scutellum length 1.05 ± 0.07 ; scutellum width 0.88 ± 0.1 ; fore leg: femur length 3.1 ± 0.14 ; tibia length 3.95 ± 0.49 ; tarsi length: I 1.25 ± 0.07 , II $0.180.02$; III 0.25 ± 0 .

Female: *Measurements* ($n = 10$): Body length 9.85 ± 1.2 ; head length 2.75 ± 0.35 ; width across eyes 1.18 ± 0.4 ; interocular distance 0.55 ± 0 ; interocellar distance 0.24 ± 0.2 ; postocular distance 1.38 ± 0.25 ; antennal segments: I 0.78 ± 0.17 , II 2.65 ± 0.9 , III 2 ± 0.14 , IV 2.15 ± 0.07 ; rostral segments: I 1.05 ± 0.07 , II 1.47 ± 0.04 , III 1.55 ± 0 , IV 0.58 ± 0.04 ; pronotum length 1.65 ± 0.21 ; width across humeral angles 1.8 ± 0.14 ; width across anterior margin 0.45 ± 0.07 ; scutellum length 1.15 ± 0.14 ; scutellum width 0.75 ± 0.14 ; fore leg: femur length 3.2 ± 0.42 ; tibia length 3.9 ± 0.42 ; tarsi length: I 1.25 ± 0.07 , II $0.180.05$; III 0.21 ± 0.06 .

Biology.—This species is very common at Los Tuxtlas, Veracruz. It was found from January to December, although there was an increase in its population during April and May. Data from different localities showed that this species feeds on seeds of

Ficus albotomentosa Lundell, *F. cotinifolia*, *F. maxima* Mill., *F. obtusifolia* Kunth in H. B. K., *F. pertusa* L., *F. retusa* L., *F. tecolutensis* (Liebm.) Miq., and on fruits of *F. yoponensis* Desv. that were already in the ground on a late decomposition stage. Adults and nymphs are active under the crown of the fruiting figs especially in areas where there was some ground vegetation. Its life cycle required about 48 d to complete. In the laboratory, eggs were laid mainly on a humid cotton ball or on fruit. Eggs were yellowish when laid and turned reddish after a few days; nymphs eclosed after eight days. First-instar nymphs molted to second instar after eight d; second instar lasted ten d, and third, fourth and fifth instars lasted between seven and eight d. Adults kept in the laboratory lived for two months. In Los Tuxtlas, this species also has been observed feeding on seeds of *Cecropia obtusifolia* Bertol.

Neopamera bilobata (Say)
(Figs. 3A–G)

Egg (Fig. 3A).—Elongate with posterior pole slightly sharp and anterior pole rounded. Pale yellow when laid, becoming reddish with development of the embryo; 0.86 ± 0.03 mm long by 0.35 ± 0.00 mm wide ($n = 10$). Chorion with small, uniformly distributed punctures. Operculum with 4–5 mycophil processes.

First instar (Fig. 3B).—Elongate, with abdomen only slightly wider than thorax. Head, pro-, and mesonota pale brown; eyes reddish brown; antennal segments I, II and distal half of IV pale yellow, segment III and proximal half of IV dark brown. Rostrum and legs grayish yellow. Base of metanotum with pale brown and pale yellow areas. Abdominal segments I, II and proximal half of IV pale yellow, remainder of segment IV and segment V red; last three abdominal segments pale yellow with a few ochraceous areas along lateral margins. Scent gland openings between segments III–IV, IV–V, and V–VI pale brown, elongated, narrowing caudally. Tylus reaching

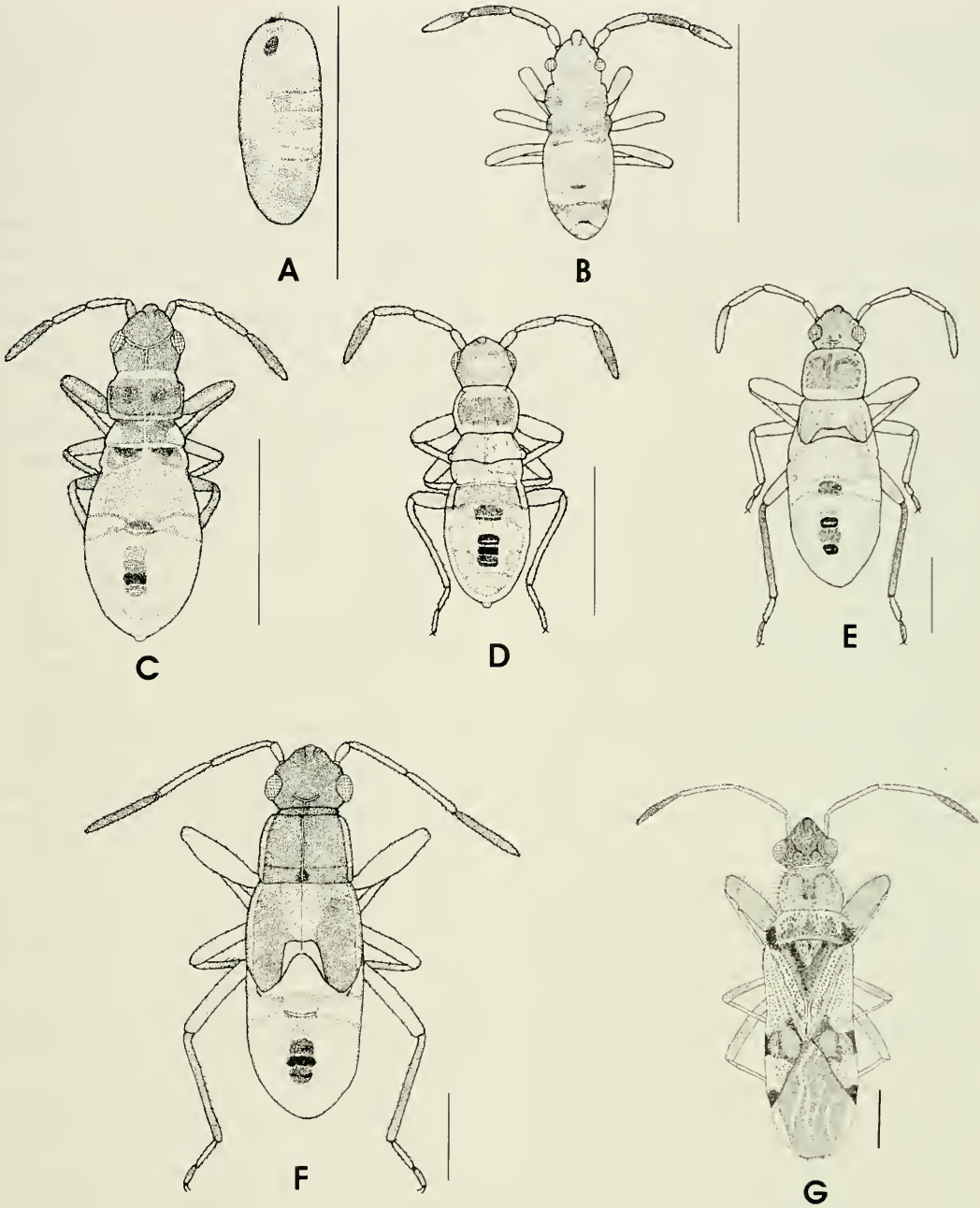


Fig. 3. Instars of *Neopamera bilobata* Say. A, Egg. B, First instar. C, Second instar. D, Third instar. E, Fourth instar. F, Fifth instar. G, Adult male. (Scale = 1 mm)

three-fourths of first antennal segment; rostrum reaching metacoxae. Head with a few disperse hairs especially around apex of tylus. *Measurements* (n = 10): Body length 1.26 ± 0.57 ; head length 0.29 ± 0.06 ;

width across eyes 0.34 ± 0.01 ; interocular distance 0.20 ± 0.01 ; postocular distance 0.03 ± 0.01 ; antennal segments: I 0.1 ± 0.00 , II 0.19 ± 0.01 , III 0.18 ± 0.01 , IV 0.30 ± 0.01 ; rostral segments: I 0.14 ± 0.03 ,

II 0.16 ± 0.00 , III 0.13 ± 0.02 , IV 0.14 ± 0.02 ; pronotum length 0.14 ± 0.04 ; width across humeral angles 0.29 ± 0.01 ; width across anterior margin 0.29 ± 0.02 ; fore leg: femur length 0.34 ± 0.01 ; tibia length 0.38 ± 0.02 ; tarsi length: I 0.12 ± 0.0 , II 0.15 ± 0.01 .

Second instar (Fig. 3C).—Body elongate, becoming antlike because of narrower mesonotum. Head and pronotum dark brown; antennal segment I grayish yellow, segments II and III pale yellow, segment IV reddish brown. Rostral segment I and apex of IV brown, segments II and III, and rest of IV pale yellow. Lateral margins of meso- and metanota varying from pale yellow to red, midline pale yellow. Femora and tibiae brown, tarsi grayish yellow. Thoracic pleura mostly brown, with shiny red and yellow reflections dorsally. Abdominal segments I and II with a pale brown macula on each side of midline, midline and lateral margins yellowish white; anterior three-fourths of segment III pale brown with a subapical red band transverse to union with segment IV. Scent gland between segments III-IV encircled by a white band delimited in red on outer margins, this band also extending down along lateral margins of segments IV to VI; segments IV to VIII reddish yellow; rectangular scent gland openings dark brown with a similar rectangular red area located anterior to glands IV-V and V-VI. Head slightly declivent; dorsal surface of head, thorax, and abdominal segment III with a few long and erect hairs; antenna covered by numerous small hairs; abdominal venter with numerous caudally directed hairs. Rostrum just reaching metacoxae. *Measurements* ($n = 10$): Body length 1.8 ± 0.18 ; head length 0.38 ± 0.02 ; width across eyes 0.43 ± 0.02 ; interocular distance 0.29 ± 0.02 ; postocular distance 0.05 ± 0.05 ; antennal segments: I 0.13 ± 0.01 , II 0.25 ± 0.01 , III 0.23 ± 0.02 , IV 0.40 ± 0.02 ; rostral segments: I 0.22 ± 0.02 , II 0.22 ± 0.02 , III 0.17 ± 0.01 , IV 0.18 ± 0.02 ; pronotum length 0.24 ± 0.01 ; width across humeral angles 0.27 ± 0.06 ; width across anterior margin 0.28 ± 0.02 ; fore leg: femur length 0.46 ± 0.02 ; tibia

length 0.50 ± 0.2 ; tarsi length: I 0.16 ± 0.02 , II 0.16 ± 0.02 .

Third instar (Fig. 3D).—Antlike, with a rounded head and protruding eyes. Head ochraceous brown; antennal segments I and III yellowish white, segment IV reddish brown. Pronotum with anterior, posterior, and lateral margins ochraceous, rest pale brown. Meso- and metanotum ochraceous with a few brown areas delimiting what are going to be the wings and scutellum. Femora and tibiae ochraceous, tarsi pale yellow. Pale brown areas of abdomen turns ochraceous; white band between segments III and IV becomes more apparent and well defined. Rostrum reaching mesocoxae. Erect hairs of abdominal dorsum are bent caudally. Front femora wider than midle and hind femora. *Measurements* ($n = 10$): Body length 2.33 ± 0.17 ; head length 0.40 ± 0.07 ; width across eyes 0.55 ± 0.03 ; interocular distance 0.37 ± 0.02 ; postocular distance 0.08 ± 0.08 ; antennal segments: I 0.16 ± 0.02 , II 0.34 ± 0.02 , III 0.32 ± 0.03 , IV 0.45 ± 0.03 ; rostral segments: I 0.28 ± 0.03 , II 0.31 ± 0.02 , III 0.20 ± 0.03 , IV 0.23 ± 0.01 ; pronotum length 0.36 ± 0.03 ; width across humeral angles 0.40 ± 0.03 ; width across anterior margin 0.38 ± 0.02 ; fore leg: femur length 0.64 ± 0.4 ; tibia length 0.76 ± 0.04 ; tarsi length: I 0.21 ± 0.03 , II 0.21 ± 0.03 .

Fourth instar (Fig. 3E).—Body elongated, ant like shape. Head, pro-, meso-, and metanotum ochraceous; lateral margins of pro- and mesonotum dark brown. Yellowish white banda along union between abdominal segments III and IV delimited frontally and caudally by a red band; dark brown area in front of scent gland of segments IV-V dissappear almost totally and the one in front gland V-VI turns reddish; scent gland opening III-IV turns pale brown. Head slightly declivente with pop out eyes; rostrum reaching mesocoxae. Mesothoracic wing pads covering almost totally metanotum. Front femora with two rows of dark brown spines in number of 2 or 3. *Measurements* ($n = 10$). Body length 3.02 ± 0.23 head length 0.57 ± 0.07 ; width across eyes

0.74±0.03; interocular distance 0.47±0.02; postocular distance 0.07±0.07; antennal segments: I 0.24±0.01, II 0.53±0.02, III 0.49±0.01, IV 0.64±0.03; rostral segments: I 0.39±0.03, II 0.40±0.03, III 0.24±0.03, IV 0.27±0.03; pronotum length 0.57±0.03; width across humeral angles 0.68±0.06; width across anterior margin 0.53±0.03; scutellum length 0.31±0.03; scutellum width 0.42±0.02; fore leg: femur length 0.79±0.03; tibia length 1.10±0.05; tarsi length: I 0.30±0.02, II 0.29±0.02.

Fifth instar (Fig. 3F).—Elongated, an ochraceous general coloration, with ostensible scent gland openings and white band between segments III and IV. Similar to fourth instar, although sometimes hind tibia are brown, as well as tarsi II. Scent gland of segments III–IV turns ochraceous. Ocelli appear as small red spots on moulting suture. Spines of front femora turn larger and more numerous. Meso- and metathoracic wing pads reaching middle of abdominal segment III. *Measurements* (n = 10): Body length 4.62±0.25; head length 0.72±0.07; width across eyes 0.92±0.03; interocular distance 0.55±0.04; interocellar distance 0.26±0.26; postocular distance 0.07±0.02; antennal segments: I 0.36±0.03, II 0.74±0.04, III 0.72±0.03, IV 0.84±0.05; rostral segments: I 0.50±0.05, II 0.51±0.31, III 0.35±0.04, IV 0.35±0.03; pronotum length 0.86±0.04; width across humeral angles 1.04±0.11; width across anterior margin 0.66±0.06; scutellum length 0.64±0.02; scutellum width 0.71±0.06; fore leg: femur length 1.32±0.09; tibia length 1.61±0.11; tarsi length: I 0.51±0.02, II 0.34±0.04.

Adult (Fig. 3G).—Body elongated, ant-like shape. Head pale brown with numerous silvery hairs. Antennal segments I to III yellowish brown, segment IV brown. Rostrum yellowish brown. Pronotum varying from brown to yellowish brown, generally with lateral margins of posterior lobe dark brown, covered by long hairs. Propleura pale brown, meso-, and metapleura dark brown; acetabula yellowish white. Proximal

half of femora yellowish brown, distal half dark brown; tibiae and tarsi yellowish brown, apices of tibiae sometimes dark brown. Scutellum dark brown, only lateral margins pale brown, surface covered by numerous silvery hairs. Chorion whitish yellow with numerous brown hairs, with a brown band along midline and a small brown macula near apex. Membrane translucent with some brown areas between veins. Head slightly declivent, pop out and large eyes. Rostrum reaching mesocoxas. Front femur with two rows of ventral spines.

Male: *Measurements* (n = 10): Body length 5.17±0.49; head length 0.71±0.09; width across eyes 0.97±0.05; interocular distance 0.51±0.02; interocellar distance 0.26±0.26; postocular distance 0.06±0.02; antennal segments: I 0.42±0.04, II 1.18±0.12, III 0.94±0.07, IV 1.06±0.11; rostral segments: I 0.53±0.05, II 0.62±0.09, III 0.46±0.09, IV 0.37±0.03; pronotum length 1.26±0.15; width across humeral angles 1.25±0.35; width across anterior margin 0.87±0.07; scutellum length 0.97±0.10; scutellum width 0.71±0.07; fore leg: femur length 1.51±0.21; tibia length 1.98±0.27; tarsi length: I 0.65±0.03, II 0.15±0.01; III 0.19±0.02.

Female: *Measurements* (n = 10): Body length 5.15±0.36; head length 0.72±0.07; width across eyes 0.97±0.07; interocular distance 0.55±0.02; interocellar distance 0.29±0.29; postocular distance 0.09±0.02; antennal segments: I 0.4±0.04, II 0.097±0.08, III 0.83±0.08, IV 0.96±0.06; rostral segments: I 0.54±0.02, II 0.63±0.04, III 0.43±0.03, IV 0.37±0.02; pronotum length 1.14±0.06; width across humeral angles 1.23±0.17; width across anterior margin 0.7±0.16; scutellum length 0.93±0.08; scutellum width 1.7±0.10; fore leg: femur length 1.58±0.15; tibia length 1.86±0.18; tarsi length: I 0.56±0.06, II 0.147±0.00; III 0.17±0.02.

Biology.—*Neopamera bilobata* was present all year around, although in Los Tuxtlas it was very abundant between March

and April. In the field both adults and nymphs were found gregariously on the leaf litter under fruiting fig trees. They moved actively, feeding on seeds of fresh and dry fruits. Nymphs of fourth and fifth instar and adults also were found between weeds. *N. bilobata* was collected in Los Tuxtlas associated with *Ficus perforata* L., *F. pertusa*, *F. tecolutensis*, and *F. yoponensis*, species that were frequently found in grazing areas, used as fences or for shadow for the cattle. In La Mancha it was found only in a few occasions associated with figs, although it was collected associated mainly with *Euphorbia* sp. and other weeds. In Tamaulipas it was commonly found feeding on fig seeds contained in racoon excrement deposited near fig trees. Other fig species host of *N. bilobata* were: *F. albotomentosa*, *F. aurea* Nutt, *F. calyculata* P. Miller, *F. cookii* Standl., *F. cotinifolia*, *F. maxima*, *F. obtusifolia*, *F. retusa*. The life cycle of *N. bilobata* took around 36 d, the egg hatched after 7 d, it was white for a day, then turns yellowish and finally reddish with the development of the embryo. First instar nymphs lasted 8 d, second instar 6 d, third 5 d, and fourth and fifth instar nymphs only 5 d. Adults kept in laboratory lasted 22 d.

Adults and last instar nymphs are very similar to ants due to the shape of their body, size, color, and movement. It is also considered a terrestrial facultative species according to Slater's (1972) classification. It has been reported feeding on *Chenopodium ambrosoides*, *Croton* sp., *Richardia* sp., *Solidago* sp., *Euphorbia maculata*, and has been considered as a pest of strawberries in Florida (Slater and Baranowski, 1990). Rodriguez (1998b) reported *N. bilobata* associated with *Ficus padifolia* H.B.K. in Costa Rica.

DISCUSSION

These three species of Myodochini are considered multivoltine due to: their polyphagous habit, the asynchronous fruting of their fig hosts, which provide resources all year around, and regarding to their short

life cycles varying from 40 to 50 d. As some species of Ozophorini (Cervantes et al, in press) these Myodochini probably move from one fruting fig to another or to another host other than figs. *N. bilobata* seems to be the more polyphagous species, feeding on 12 species of figs and on fig seeds contained in racoon excrement; *M. unispinosa* feeds on eight species; and finally *M. intermedia* which was only found feeding on two species of figs. It was common to found these species living sympatrically, and it was also common to found them associated with *Ozophora baranowskii* Slater and O'Donnell and *O. maculata* Slater and O'Donnell; no predators of parasitoids have been recorded for these Myodochini species.

Nymphs of IV and V instars of the two *Myodocha* species can be differentiated morphologically by the coloration of the legs, *M. intermedia* nymphs have the annulated femora characteristic of the adult stage, while *M. unispinosa* femora are unicolorous or have the distal two-thirds brown. Mesothoracic wing pads of fifth instar nymphs of *M. intermedia* are lighter than in *M. unispinosa*.

ACKNOWLEDGMENTS

We are very grateful to Aaron Sanchez for the drawings of *Myodocha unispinosa* and *Neopamera bilobata* and to Iliana Pacheco for also recording some of the biological information. Financial support was granted by a CONACYT project (34238-V) assigned to the first author.

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